Focusing on Time and Depth Migration Processes of the Multi Channel Seismic Reflection Data from Bababurnu Shelf, Canakkale

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Abstract

The seismic properties of the continental shelf of Bababurnu area have been investigated by using multichannel marine seismic reflection data which was collected along NW-SE oriented profiles in the Aegean Sea. The aim of the study is to trace the continuation of E-W trending main fault, the Behramkale Fault, along the northern shores of Edremit Gulf and to make comparison between time migrated and depth migrated sections in order to have knowledge on their advantages and disadvantages.

Introduction

The data used in this study are multi-channel seismic reflection data gathered on offshore Bababurnu, (Fig. 1), which is located in the northwest shores of Edremit Gulf. Four seismic lines were collected, BAB1-BAB4 by MTA r/v Sismik-1 in 1996. The data were re-processed and interpreted at Nezihi Canıtez Data Processing Laboratory in İstanbul Technical University in this M.Sc. thesis work. The geology of the region consists of Pre-Tersiyer main formation, Küçükkuyu formation, granitic plutons, Ayvacık volcanic community, Bayramiç formation with basalt lavas and sedimentary fill of Edremit graben. The main faults observed in the region are the members of southern branch of the North Anatolian Fault (Yılmaz and Karacık, 2001).

Materials and Methods

Seismic reflection data were processed by means of digital signal analysis before interpretation. For this reason, the data must be passed through processing steps such as: eliminating the undesired traces in the data set, definition of shot-receiver geometry, application of the frequency filters, application of gain recovery, sorting shots into common-depth-point gathers, velocity analysis and NMO correction, removing multiple reflections, stacking and automatic amplitude gain application. Finally, migration process was applied to the stack sections both in time and depth domain.

Results

Seismic migration must be carried out in order to locate the seismic reflection signals to their correct positions and to collapse the diffracted signals. For the time-domain migration, it was observed that the seismic reflections could not be improved as expected due to the complex structure of the bathymetry, subsurface geology and lateral velocity changes emerging from this complexity (Fig.2). For this reason, migration of seismic reflection data was also carried out in the depth domain. Better results are evident as the depth domain migration process is linked to the well-defined velocity model. As seen in the Fig.2a, the reflections on the time migrated section are not improved as the depth migrated section (Fig 2b). For this reason, improved reflections in the depth migrated section helps us to better interpret the geological features.

Innovation

The innovative side of this study is based on showing the improvement of the seismic sections after depth migration with well defined velocities in comparison to the time domain migration.

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